

NERRS Science Collaborative Progress Report

Reporting Period: September 1, 2012 – February 28, 2013

Project Title: Implementing Credits and Incentives for Innovative Stormwater Management

Principal Investigator(s): Amy H. Brennan

Project start date: November 15, 2011

Report compiled by: Amy H. Brennan

Contributing team members and their role in the project:

- *Project Coordination and Fiscal Agent:* Amy H. Brennan; Chagrin River Watershed Partners, Inc.
- *Collaboration Lead:* Heather Elmer; Old Woman Creek National Estuarine Research Reserve with Ona Ferguson; Consensus Building Institute providing Collaboration Technical Assistance
- *Applied Science Investigator:* Jay D. Dorsey; ODNR, Division of Soil and Water Conservation
- *Additional project team members:*
 - Breann M. Hohman and Crystal Dymond; Erie Soil and Water Conservation District
 - Frank Lopez and Cheryl Wolfe-Cragin; Old Woman Creek National Estuarine Research Reserve
 - Keely Davidson-Bennett, Chagrin River Watershed Partners, Inc.

A. Progress overview:

The goal of this project is to promote the implementation of Low Impact Development (LID) and other innovative stormwater systems in the Ohio Lake Erie Basin by addressing barriers to implementation, gathering data on local best management practices (BMPs), building capacity of local stormwater professionals, and developing tools to effectively guide communities and consultants toward more sustainable stormwater management. This project will also highlight the role of LID in adapting to changes in rainfall volumes and intensities due to climate change. The project team includes the Chagrin River Watershed Partners (CRWP), Old Woman Creek National Estuarine Research Reserve (OWC NERR), Ohio Department of Natural Resources Division of Soil and Water Resources (ODNR-DSWR), Erie Soil and Water Conservation District (Erie SWCD), and the Consensus Building Institute (CBI).

Planned activities during this reporting period included: meetings, coordination, and documentation with the project team and collaborative learning group (CLG), document lessons learned, assist with design of BMPs, characterize site soils at BMP locations, begin monitoring, develop, calibrate, and validate models, provide training through CLG, and provide technical assistance on adoption and implementation of local codes. CRWP entered into contracts with Cardno/JFNew to complete modeling work in coordination with our Applied Science Investigator, Jay Dorsey from ODNR-DSWR. The Project Team has been working closely with our monitoring contractor, North Carolina State University (NCSU)/Biohabitats, to complete the monitoring plans for this project and determine which sites are most appropriate for monitoring activity. The project team selected five (5) sites to assist with the design and possible monitoring of BMPs and has been working with each of these site owners and their engineers on design of BMPs. NCSU and CLG members have commented on the design as well providing additional learning opportunities for design and monitoring for all involved. ODNR-DSWR completed infiltration tests at Orange Village. The Perkins Township Administration Building stormwater BMPs have been measured for installation of monitoring equipment which will commence in April 2013.

CRWP and Erie SWCD have been working with communities to adopt and implement model zoning codes to promote good land use decisions and promote LID, including a workshop with Erie County communities to discuss model code language and adoption, and follow up technical assistance from Erie SWCD and a land use planner at Cleveland State University. CRWP is also revising our model regulations for stormwater management and off street parking and provided adoption and implementation assistance to numerous CRWP Member communities.

B. Working with Intended Users:

During this six month period the project team has continued regular conference calls (11 project team conference calls and over 15 informal meetings and calls) and two in-person project team meetings. We held one CLG meeting and had several site visits with intended users. The CLG meeting held during this reporting period on October 18, 2012 included a site visit

to the Old Woman Creek National Estuarine Research Reserve where participants discussed research at the Reserve and the proposed design for pervious asphalt. The meeting included a discussion of different types of swales and their functionality and a presentation by our monitoring contractor, North Carolina State University, introducing broad monitoring issues and specific design considerations. More detail, including full presentations and meeting summaries are posted online at <http://nerrs.noaa.gov/NSCIndex.aspx?ID=691#1>. Likewise, on this website are two Project Updates that were sent to the CLG between CLG meetings to keep them abreast of project activities. Attendance at CLG meetings continues to be strong, and we have invited additional engineers involved in design assistance efforts funded by the project to join the group.

Our project team is centrally involved with the design of four sites, engaging additional intended users through review of stormwater BMP designs and discussion of how to incorporate monitoring at each site. The project team and monitoring contractors have participated in all the discussions. As sites reached a 60% design level, the entire CLG was invited to participate in meetings in person or as a part of a conference call, and all site design iterations and meeting notes have been posted to a public ftp site to provide additional opportunities to comment on all sites, learn in real time from the process and share perspectives as designs are refined. One-two CLG members participated in each of these meetings to date with an additional 1-2 members commenting via e-mail. A designated project team lead is coordinating the project team's interactions for each site and documenting the design, construction, and monitoring process to lay the groundwork for development of case studies and training materials.

C. Progress on project objectives for this reporting period:

Objective 1: Engage stormwater professionals in a collaborative process to identify and remove regulatory and technical barriers to implementation of LID in Ohio.

1. Completed activities and products:
 - a. Held one collaborative learning group (CLG) meeting on October 18, 2012. Produced and distributed two project updates (emails) for CLG members and others interested in the project (sent out on September 24, 2012 and January 24, 2013)
 - b. Documented lessons learned, conflict, and ideas from CLG meetings in summaries, which are widely shared, and in our private project notes on lessons learned housed on Basecamp.
 - c. Provided opportunities for CLG members to comment on site design for potential monitoring sites.
 - d. Invited design engineers to participate in CLG meetings.

Objective 2: Quantify BMP specific and site level hydrology for local soil and climate characteristics.

1. Assist with design, construction oversight, and monitoring of LID BMPs
 - a. Worked with 4 sites on design assistance.
 - i. Pepper Pike: Completed a review of 60% design.
 - ii. Willoughby Hills: Working on 60% design.
 - iii. Old Woman Creek: Completing final design.
 - iv. Orange Village: Working on 60% design.
 - b. Selected 5 possible sites for monitoring.
 - c. Measured Perkins Township site for monitoring equipment at the new administration building site, planned to be installed April 2-3, 2013.
2. Characterized soil infiltration at Orange Village.

Objective 3: Simultaneously model treatment of water quality and quantity volumes to meet local and state requirements.

Applied Science Investigator, Jay Dorsey developed a comprehensive scope for all modeling activities that we would like to complete for this project. This scope exceeds our initial budget and scope for our modeling activities so we are currently investigating opportunities for additional funding to complete the full scope and expand our deliverables under this project.

In January 2013, CRWP signed a contract with Cardno/JFNew to complete the following components of our modeling objectives:

1. Develop Climate Data Sets for Hydrologic Characterization Based on Historic Data
2. Develop Unit/Base SWMM Models and Complete Sensitivity Analysis for Hydrologic Characterization of Individual Stormwater BMPs
3. Development of Preliminary Site-Scale SWMM Model for Quantification, Evaluation, and Comparison of Stormwater BMPs for Runoff Volume Reduction, Water Quality Volume Treatment, Peak Discharge Control and Flow Duration
4. Develop site scale models and perform sensitivity analysis.

Objective 4: Adapt models to include rainfall runoff scenarios anticipated as a result of climate change and characterize climate change adaptation functions of LID BMPs.

On December 14, 2012, OWC NERR organized a conference call with researchers from the University of Michigan to further explore the current research on development of climate data sets that may be adapted as inputs to our modeling to determine the performance of stormwater BMPs under future project climatic conditions. Since this call, Jay Dorsey has developed a description of the project's data set needs for climate change scenario analysis which will be shared with these and other climate researchers.

Objective 5: Develop and provide training and technical assistance materials to build capacity of stormwater professionals and communities to implement LID approaches.

1. Provide informal training to the CLG:
 - a. The CLG meeting on October 18, 2012 provided training to CLG members on: monitoring equipment and installation, designing BMPs to allow monitorability, and different swale designs and functionality.
2. Provide formal training and technical assistance to stormwater professionals: Project team members participated in planning and presenting three training sessions sponsored by the Northeast Ohio Stormwater Training Council:
 - a. September 27, 2012 – Site tours to and training on best practices for development including conservation development, riparian and wetland setbacks, innovative stormwater management, and traditional neighborhood development.
 - b. October 11, 2012 – Erie SWCD and OWC NERR organized and led a stormwater construction site BMPs and CESSWI Review Course that included a site visit to a pervious pavement installation that will be monitored in conjunction with this project.
 - c. December 5, 2012 – Runoff Reduction Method and spreadsheet tool training with Center for Watershed Protection.
 - d. The team is also developing a training series for landscapers on design, construction and maintenance of stormwater BMPs, planned for July and November 2013.
3. Model regulations that remove regulatory barriers to LID:
 - a. CSU and CRWP evaluated model codes for natural landscaping, street design, tree protection, and revision of a development code review.
4. Provide technical assistance on the adoption and implementation of local codes and project recommendations.
 - a. CRWP shared model codes for green streets, off street parking, tree protection, and natural landscaping with West Creek Preservation Committee in February 2013.
 - b. Erie SWCD and CSU provided technical assistance with local code review for seven communities and agencies in Erie County in October and November 2012.
5. Support development of Ohio specific guidance on design, construction, cost, operation and maintenance of BMPs:
 - a. CRWP is working with Cuyahoga County Board of Health, Cuyahoga SWCD, Ohio EPA and ODNR-DSWR to develop guidance for the operation and maintenance of stormwater BMPs for Ohio.

What data did you collect?

- Measured Perkins Township BMP installation for monitoring equipment installation.
- Soil and site characterization data for modeling at Orange Village.
- CLG input on BMP design and monitoring.
- CLG feedback on collaborative process.
- Stormwater workshop participant feedback regarding interest in project-related training opportunities.

Has your progress in this period brought about any changes to your methods, the integration of intended users, the intended users involved or the project objectives?

The CLG requested winter monitoring at sites to determine functionality of stormwater BMPs during frozen conditions and requested water quality monitoring that was not originally proposed for these sites. After exploring the capacity of monitoring equipment and the possibility of using water quality monitoring equipment from Ohio EPA and OWC NERR, the project team thinks we can monitor for an extended season and instrument at least two sites for water quality monitoring.

Have there been any unanticipated challenges, opportunities, or lessons learned?

We have learned it can be difficult to keep track of the various things we are learning on a given site (and to track how decisions are made), and also challenging to keep notes on key lessons from our intended users. As a result, we have discussed the challenge and suggested solutions with colleagues in the NERRS system and with Science Collaborative colleagues. The project team has begun to track lessons learned on this project through a suite of lessons learned documents available on basecamp. Tracking across general categories of monitoring, modeling, collaboration, maintenance, and construction.

What are your plans for meeting project objectives for the next six months?

In the coming six months, we anticipate holding two CLG meetings (April 24 & July 17). We plan to shift to holding longer CLG meetings three times a year starting in 2013, as it is difficult to have a robust site visit (that requires an hour or more) and then have enough time to really dig in to discussions on other project activities at our sit down meeting (that may really require more than 2.5 hours). In 2012 our meetings were four hours long (9-1pm, including lunch), and we had four of them. In 2013, we expect to have three CLG meetings and for them to last from approximately 9am to 3pm. We will continue to send out one CLG Update, a one to two page synthesis of key activities, at the mid-point between meetings. We will continue to provide additional opportunities for CLG members to be engage in the design of projects funded through this project. Two upcoming meetings are scheduled to review designs Orange Village (March 14) and Willoughby Hills (March 19).

Objective 1:

1. Two CLG stakeholder meetings.
2. Two CLG design review meetings
3. Informal training on stormwater monitoring equipment, protocols, and data management for CLG members, project partners and others.
4. Produce two project updates.
5. Valuation of the collaborative process.

Objective 2:

1. Site characterization at Willoughby Hills and Pepper Pike monitoring sites.
2. Design each BMP so discharge over the entire range of rainfall events can be measured.
3. Characterize BMP drainage area and site watershed.
4. Work with monitoring contractor, USGS and project team to fully instrument BMPs to track hydrologic performance.
 - a. Calibrate weirs to develop a stage-discharge relationship.
5. Begin data collection from monitoring of BMPs at Perkins Township Administration Building.
6. Observe construction at Old Woman Creek NERR, Orange, Pepper Pike, Willoughby Hills and instrument for monitoring.
7. Continue exploration of construction and monitoring of swales at Holden Arboretum.

Objective 3:

1. Complete initial modeling contract/scope of work with Cardno/JFNew.
2. Continue to explore additional funding opportunities to complete desired scope of modeling that exceeds original project scope.

Objective 4:

1. Continue to explore climate change data availability for modeling.

Objective 5:

1. Provide informal training through CLG meetings.
2. Provide technical assistance on the adoption and implementation of local codes and project recommendations.
3. Solicit CLG input on approach for training and tool development through this project.
4. Begin development of training materials on BMP life cycle.
5. Give an invited presentation on the collaborative process of this project at the International Association for Great Lakes Research Conference on June 2 – 6, 2013 in West Lafayette, Indiana.
6. Distribute project updates and information at the Ohio Stormwater Conference in May 2013.
7. Provide training for landscapers in Northern Ohio on design, construction and maintenance of stormwater BMPs on residential property in July 2013.

- D. Benefit to NERRS and NOAA: List any project-related products, accomplishments, or discoveries that may be of interest to scientists or managers working on similar issues, your peers in the NERRS, or to NOAA. These may include, but are not limited to, workshops, trainings, or webinars; expert speakers; new publications; and new partnerships or key findings related to collaboration or applied science.**

We continue to build long term monitoring capacity, and hope we might be laying the groundwork for a stormwater research center in Ohio. This may be applicable to other projects and regions. Several universities have expressed some level of interest and are participating in CLG meetings, investigating BMP installation at their facilities, or have expressed interest in monitoring equipment installation. The University of Toledo is interested in visiting the Perkins Township site during equipment installation. Other universities that have expressed interest include: Case Western Reserve University and Bowling Green State University. The project team will continue to provide informal education opportunities for these and other educational institutions to promote the establishment of a long term, robust stormwater monitoring program.

- E. Describe any activities, products, accomplishments, or obstacles not addressed in other sections of this report that you feel are important for the Science Collaborative to know.**

None.